C-AD

Radiation Safety Committee

Issued: January 7, 2005

Minutes of Radiation Safety Committee of December 7, 2004

Subject: RD1/2 as critical devices for the NSRL Target Room

Present: D. Beavis, E.T. Lessard, J.W. Glenn, L. Ahrens, K. Yip, R. Karol, A. Javidfar. A. Rusek, A. Etkin, and N. Williams

It has been proposed that the two magnets RD1 and RD2 be used as critical devices for access to the NSRL target room. Additional modes of operation would be added to the access control logic to allow personnel into the target room with the extraction dipole on and the beam plug open. The dipoles are not intended as a location to dump beam. Rather the beam permit system would be used to turn off components of the extraction system for the NSRL beam line. The beam would therefore remain in the booster and not be extracted except for a fault condition. The beam permit system is not sufficiently robust to be considered as a critical device and therefore two devices in the transport line must serve the purpose of critical device to prevent exposure in the NSRL target room.

The committee recommends that this approach can be used.

The beam permit description and the results of a fault study were provided by A. Rusek (see attachment 1). The fault study measured the potential dose rate in the NSRL target room if beam were dumped in the area of RD1/2. A 1 GeV proton beam with an intensity of 2*10**10 protons/spill was used for the fault study. The dose rate in the target room was 0.3 mrem/hr and the upstream labyrinth chipmunk (132) registered 0.04 mrem/hr. Chipmunk 132 interlocks at 2.5 mrem/hr and would thus limit the dose rate in the target room to 18.75 mrem/hr. The alarm level would warn operators with a corresponding dose rate of 7.5 mrem/hr in the target room. The estimated dose rate was scaled to the maximum energy of 3 GeV protons using curves in A.H. Sullivan, which provided numbers in the angular region of 20 degrees. The largest potential dose would occur if full energy protons were extracted at the maximum of 10**14 protons per spill. The maximum resultant dose to personnel in the target room would be 5-6 mrem per spill. The chipmunk 132 would stop the beam in one of two pulses.

The committee recommended that the stub tunnel chipmunks be used to supplement the upstream labyrinth chipmunk. If there is an operational problem for the booster, it is expected that the trip levels of these chipmunks could be adjusted. N. Williams reported that he thought the PLC software already had this logic.

(Ck-NSRL-FY2005-all-416) Verify that the stub tunnel chipmunk interlocks active when target room allowed to be occupied.
(CK-NSRL-fy2005-all-417) Check that the stub tunnel chipmunk nearest D1 and D2 provides a more sensitive trip level that the labyrinth chipmunk. After the meeting A. Rusek provided plots (see attachment 3) of the stub tunnel chipmunks for the fault study. The closest chipmunk NM133 had approximately 240 mrem/hr during the fault.

The CEE will review the dual methods for turning off the magnets RD1 and RD2. It is desired that if possible this is done with AC and DC is possible to eliminate as many as possible common mode faults.
(Ck-NSRL-FY2005-all-418) CEE review the critical device turn off.
(Ck-FY2005-all-nsrl-419) The status of RD1 and RD2 should be in the beam permit system. The beam should not be allowed to be extracted into the R beam line until the magnets are on.

(Ck-FY2005-all-nsrl-420) Operations procedures should be reviewed to examine if any changes are needed to prevent bringing beam down a mistuned NSRL beam line after D1 and D2 have been off.

Attachments (file copy only)

1) A. Rusek, "RSRL Fault Study ", Dec. 7 , 2004.
2) Plot of chipmunk 132 during the fault study.
3) Plots of the stub tunnel chipmunks during the fault study.

CC: Present
RSC
RSC Minutes file
NSRL file